

**Table 3.** Studies comparing reproductive behavior and reproductive success of hatchery and wild fish. Studies that are confounded by geographically distant hatchery stocks or have no evaluation of reproductive behavior (e.g., Kalama River Steelhead) are not included.

Study	Populations	Locally derived Hatchery population	Hatchery breeding success relative to wild	Confounded by rearing environment	Findings:
Fleming and Gross (1992) Coho salmon	Quinsam Hatchery vs. Oyster Wild	No, but close (25 km)	Males: No Difference Females: No Difference	Yes	Hatchery males were less aggressive, no other significant behavioral or breeding success differences reported.
Fleming and Gross (1993) Coho salmon	Quinsam Hatchery vs. Oyster & Black Wild	No, but close (25 & 22 km)	Males: 61% Females: 82% (in competition)	Yes	Hatchery male and hatchery female wounding exceeded that for wild males and wild females  Hatchery males were less aggressive than wild males.
Fleming et al. (1997) Atlantic salmon	River Imsa	Common parents	Males: 51% Females: No Difference	Environmental Effects only	Hatchery male wounding exceeded that for wild males. Wild males were involved in more ‘solo’ spawnings. Therefore, females courted by wild males had more mates and greater diversity.
Fleming et al. (2000) Atlantic salmon	Common farm vs. River Imsa	Partially	Adult-to-parr: 19% Adult-to-adult: 16%	Yes	Farmed males and females exhibited unnatural reproductive behavior, and poor embryo survival
Berejikian et al. (1997) Coho salmon	Stavis Captive vs. Big Beef Wild	No, but close (7 km)	Males: 17% Females: 50% (in competition)	Environmental Effects only	Greater adult-to-fry recruitment success was attributed to increased competitive ability of wild fish. No gamete quality differences.

### **Table 3. Summary and Conclusions.**

1. Differences in breeding success between hatchery and wild populations has only been demonstrated under conditions of mutual competition. Hatchery adults are less aggressive and no evidence that they disturb or reduce the breeding success of wild fish.
2. A genetic basis for differences in competitive ability of hatchery and wild adults may exist but has not been demonstrated. Thus far, results have been confounded by early rearing environment effects. For example, 49% reduction in male breeding success in Atlantic salmon can be accounted for entirely by early (egg-to-smolt) rearing environment, which is less than the 39% reduction in a hatchery population of coho salmon that had undergone 5 generations of culture.
3. Rearing environment, independent of genetic effects, on competitive ability of captive-reared and wild adults has been demonstrated (Berejikian et al. 1997, Fleming et al. 1997).
4. Therefore, the primary risk of locally derived hatchery fish on the spawning grounds with wild fish is through the combination of 1) introgression that might decrease fitness of hybrids, and 2) competitive interactions following emergence from the gravel. Basically, offspring of hatchery fish suffer high mortality, while at the same time are more competitive on a one-to-one basis.
5. The published studies indicate that ‘masking’ may be a real problem in cases where hatchery-reared smolts are spawning naturally.